July 2006 Update

Shattuck Chemical Company
Operable Unit 8 - Denver Radium
Denver, Colorado
(5-Year Review Date: 12/21/99)

Highlights Since 1999 Special Five-Year Review

- Site remediation complete
- Monolith excavated
- 243,101 tons of contaminated materials removed to off-site disposal facility
- Last of 2,244 railcars of contaminated soil leaves July 2006
- Final Status Survey confirms removal of all radioactive materials

Brief Site History: The Shattuck Chemical Company Site, also known as Operable Unit 8 of the Denver radium Superfund Site, is 1 of 65 Denver area properties involving operating businesses that required various levels of cleanup. Radium was used for commercial purposes in the early 1900s. Ore processing facilities in Denver provided a domestic source of radium. The radium industry collapsed in the 1920s, leaving numerous locations with radioactive residues. The residues were often used as fill, as paving materials or left in place. The Denver Radium Site was added to the Superfund National Priorities List in 1983. Contaminants at the site include radium, thorium, uranium, arsenic, lead and radon gas. Radium is of most concern. Radon gas emitted from decaying radium causes lung cancer. However, radon is only a health risk if the gas is concentrated in buildings where people can be exposed for long periods of time.

The Shattuck Chemical Company, OU 8, processed radium and other ores at the site, and left behind radium contaminated soil and debris. The original Record of Decision (ROD) was signed in 1992. EPA selected on-site solidification and disposal for the clean up remedy. Solidification and capping the wastes was completed in 1997. In 1999, EPA conducted a special five-year review of the Shattuck site. The five-year review identified concerns with the long-term effectiveness of the on-site remedy. In the June 2000 ROD amendment, EPA selected off-site removal because it best met Superfund's requirements. EPA will remove the contaminated soil and monolith to an off-site licensed or permitted facility.

Current Status: Final remediation is now complete. A 750 foot-long concrete monolith erected at the site in 1992 to cap and stabilize the soils was removed along with perimeter soils beneath the monolith and soils beneath the adjacent Bannock Street right-of-way. The U.S. Army Corps of Engineers was selected by EPA to manage the remediation effort. A total of 243,101 tons of soil and building materials were removed. The last of 2,244 railcars of contaminated materials left the site on July 2006.

Summary of Protectiveness: The site is completely protective of human health and the environment. A sampling and analysis program was established to ensure that all radioactive materials were removed from the site, and the results were independently verified by the State of Colorado.

Issues Impacting Protectiveness: Issues noted during a special five-year review of the site conducted December 21, 1999 are addressed in the table below.

Shattuck Chemical Company
Denver Radium
Special Five-Year Review Update Table
(Review Date: 12/21/99)

Issues	Recommendations/ Follow-up Actions	Follow-up Actions (Status/Due Date)	Status of Follow-up Actions 12/04	Responsible Party
1) Lack of institutional control of plume outside site boundary	Secure and implement institutional control(s)	ICs are not feasible; additional plume investigation planned in FY02-FY03.	No contaminated soils are left in place, eliminating the need for institutional controls.	EPA
2) Vulnerability of cover/monolith design to long-term degradation	Performance assessment modeling of cover/monolith design long-term performance	Avoided this difficult modeling effort by issuing proposed plan to remove cover/monolith	Monolith and all affected soils removed.	EPA
3) Monolith Monitoring Plan deficiencies	Monolith Monitoring Plan upgrade	Avoided this difficult monitoring effort by issuing proposed plan to remove cover/monolith	No follow-up necessary since ROD amendment authorized monolith demolition and removal.	EPA
4) Plume Monitoring Plan deficiencies	Plume Monitoring Plan upgrade. Development of a more sophisticated groundwater and contaminant transport model.	Additional plume investigation planned in FY02-FY03. Updated Site Conceptual Model in FY01.	Monolith and all affected soils removed.	EPA
5) Site characterization and modeling deficiencies	Develop sufficient site characterization data to define plume support risk assessment	Additional plume investigation planned in FY02-FY03.	Monolith and all affected soils removed.	EPA
6) Risk assessment deficiencies	Conduct risk assessment	Site-specific risk assessment to be performed after plume investigation completed in FY03.	Final Status Survey Plan (FSSP) confirms the removal of all radioactive materials. State of Colorado independently confirms FSSP results	EPA
7) Specific design technical issues that need to be re-evaluated	Address specific design technical issues	Avoided this difficult redesign effort by issuing proposed plan to remove monolith.	No follow-up necessary since ROD amendment authorized monolith demolition and removal.	EPA